

I claim:

1 1. A method for selectively binding a neutral, positively-charged, or negatively-
2 charged molecule, in solution or in the solid state, said method comprising contacting the
3 molecule with a compound comprising a porphyrin macrocycle, and further comprising one
4 or more carboranyl groups that are linked to the porphyrin macrocycle by carbon-carbon
5 bonding.

1 2. A method as recited in Claim 1, wherein the compound comprises a
2 pentacoordinated or hexacoordinated metal ion at the core of the porphyrin macrocycle.

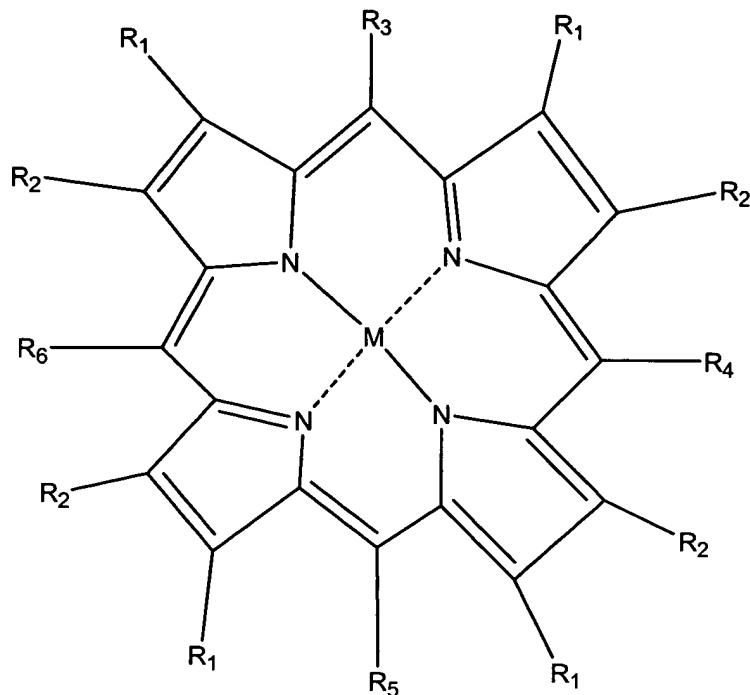
1 3. A method as recited in Claim 1, wherein the compound comprises a zinc(II),
2 iron(III), manganese(III), aluminum(III), or tin(IV) ion at the core of the porphyrin
3 macrocycle.

1 4. A method as recited in Claim 1, wherein the compound comprises one or
2 more negatively-charged *nido*-carborane groups bound to the periphery of the porphyrin
3 macrocycle.

1 5. A method as recited in Claim 1, wherein the compound comprises one or
2 more *clos*-carborane groups bound to the periphery of the porphyrin macrocycle.

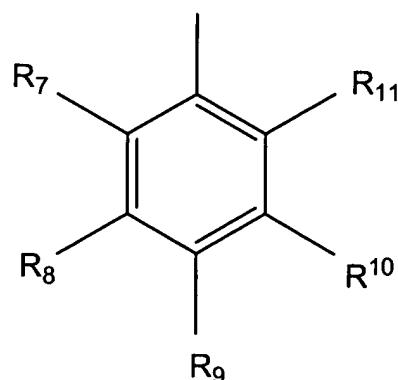
1 6. A method as recited in Claim 1, wherein the core of the porphyrin macrocycle
2 is positively charged or protonated.

1 7. A method as recited in Claim 1, wherein the compound has structure I:



15 I

16 wherein M is 2H or a pentacoordinated or hexacoordinated metal ion; R1 and R2 are each
17 independently hydrogen, C₁ to C₄ alkyl or hydroxyalkyl; and R3, R4, R5, and R6 are each
18 independently hydrogen, phenyl, or substituted phenyl having structure II:



II

29 wherein R7, R8, R9, R10, and R11 are independently hydrogen or a carboranyl group,
30 wherein such a carboranyl group is linked to the phenyl group by a carbon-carbon bond;
31 and wherein one or two of R7, R8, R9, R10, and R11 are hydrogen or such a carboranyl
32 group; and

33
34 wherein at least one of R3, R4, R5, and R6 is a substituted phenyl having structure II and
35 having at least one such carboranyl group.

1 8. A method as recited in Claim 7, wherein at least two of R3, R4, R5, and R6
2 are substituted phenyls having structure II and each having at least one such carboranyl
3 group.

1 9. A method as recited in Claim 7, wherein each of R3, R4, R5, and R6 is a
2 substituted phenyl having structure II and each having at least one such carboranyl group.

1 10. A method as recited in Claim 7, wherein at least two of R3, R4, R5, and R6
2 are substituted phenyls having structure II and each having at least one such *nido*-
3 carboranyl group.

1 11. A method as recited in Claim 7, wherein each of R3, R4, R5, and R6 is a
2 substituted phenyl having structure II and each having at least one such *clos*-carboranyl
3 group.

1 12. A method as recited in Claim 7, wherein at least two of R3, R4, R5, and R6
2 are substituted phenyls having structure II and each having at least one such carboranyl
3 group at R7 or R11.

1 13. A method as recited in Claim 7, wherein each of R3, R4, R5, and R6 is a
2 substituted phenyl having structure **II** and each having at least one such carboranyl group
3 at R7 or R11.

1 14. A method as recited in Claim 7, wherein at least two of R3, R4, R5, and R6
2 are substituted phenyls having structure **II** and each having at least one such carboranyl
3 group at R8 or R10.

1 15. A method as recited in Claim 7, wherein each of R3, R4, R5, and R6 is a
2 substituted phenyl having structure **II** and each having at least one such carboranyl group
3 at R8 or R10.

1 16. A method as recited in Claim 7, wherein at least two of R3, R4, R5, and R6
2 are substituted phenyls having structure **II** and each having at least one such carboranyl
3 group at R9.

1 17. A method as recited in Claim 7, wherein each of R3, R4, R5, and R6 is a
2 substituted phenyl having structure **II** and each having at least one such carboranyl group
3 at R9.

1 18. A method as recited in Claim 1, wherein the compound is selected from the
2 group consisting of compounds **3, 4, 5, 6, 9, 10, 11, 12, 15, 16, 17, 18, 23, 24, 28, 29, 30,**
3 **31, 33, 34, 35, and 36.**